

CHAPTER 4

METHODOLOGY FOR DREDGING PLANT

SECTION I. GENERAL

4-1. Contents. This chapter contains the methodology used to compute ownership and operating rates for dredging plant. Dredging plant is defined as marine equipment that is used for dredging operations for the majority of its plant life. See Table 2-1 for marine equipment where over the life of the equipment the plant is not typically used on a dredging project.

4-2. General. The ownership and operating rates provided in TABLE 2-1, Category M-10, are developed based on the methodology in Chapter 2 for non-dredging equipment. Those rates may be used for dredging, provided they are adjusted in accordance with the methodology provided in this chapter.

a. Ownership and operating cost factors as shown in TABLE 4-1, Dredge Plant Expense Factors, are for various types of dredging equipment and plant. When a type of equipment or plant is not listed, the cost factors may be estimated by using the factors listed in this table for a similar type of plant.

b. This rate methodology applies only to dredges and floating attendant plant engaged in any type of dredging operations.

c. Hopper dredge cost factors and operating cost rate methodology are not included in this chapter. These factors have been omitted primarily due to the limited number of hopper dredges and the complexity of the methodology used to calculate rates. Further information can be found in ER 1110-2-1302, Civil Works Cost Engineering and can be found on the Internet at <http://www.usace.army.mil/inet/usace-docs/eng-regs/er1110-2-1302/toc.htm>. Methodology for determining ownership cost (depreciation and FCCM) is determined using the methodology found "SECTION V. OWNERSHIP COST" of this chapter.

d. For mechanical dredges, the cost of the buckets are typically included in the plant value, therefore no additional allowance should be made for ownership cost. If the bucket cost is not included in the plant value, then the bucket may be treated as a separate unit of equipment and calculated using from TABLE 2-1.

SECTION II. ANNUAL USE

4-3. Time Available to Dredge.

a. The number of months available per each calendar year for the contract dredging shall be based on the work time available to dredge, excluding downtime for major

repairs, work in dry dock, bad weather, and environmental restrictions. Therefore, Figure 4-1, Months Available by Region depicts months available for dredging, including mobilization and demobilization, based on data collected from Corps of Engineers' regional dredge estimating teams. This information shall be used for computing the ownership costs. If the contract document specifies a different time in months, these months may be substituted.

b. The basis for estimating operating hours of use per month must be documented in the estimate by the cost engineer.

AVAILABLE TIME TO DREDGE BY REGION (In Months)			
<u>Region</u>	<u>Type of Dredge Operation</u>		
	<u>Pipeline</u>	<u>Bucket</u>	<u>Hopper</u>
Atlantic Coast and tributaries	9	10	10
Gulf Coast, Lower Mississippi and Tributaries	10	10	11
Great Lakes, Upper Mississippi and Tributaries	8	8	8
West Coast and Tributaries	9	9	9

Figure 4-1. - Months Available by Region

SECTION III. LIFE

4-4. Life. The life for determining ownership and operating costs is defined as follows:

a. Useful Life. The Useful Life is expressed in years in TABLE 4-1. It is the expected life used to develop ownership rates for various types of dredge plant.

b. Physical Life. The Physical Life is expressed in hours in TABLE 4-1. It is the expected life used to develop operating rates for various types of dredge plant.

4-5. Annual Hours Available. The annual hours available to dredge can be established for each type of plant based on the months available and the estimated

effective monthly hours worked. For definition of effective time refer to ER 1110-2-1302, Civil Works Cost Engineering. The total annual hours available can be expressed by formula, as follows:

$$\text{Available Hours Per Year} = \text{Months Available/Year} \times \text{Effective Hours/Month}$$

SECTION IV. SALVAGE VALUE

4-6. Salvage Value. The salvage value (SLV), expressed as a decimal, is shown in TABLE 4-1 for different types of plant.

SECTION V. OWNERSHIP COST

4-7. Ownership Cost. Ownership expense is expressed as a per cent of plant value, which is defined as the acquisition cost plus any initial capital improvements. The value of initial capital improvements is based on those betterments, which were made within one year of purchase. Capital improvements do not include any replacement or repair work. Cost for repairs or replacements are covered in the repair cost allowance, within operating cost. Capital Improvements are considered betterment's, where the plant has been improved, such as adding radar, or upgrade of engines (Note: Only the cost difference between replacement of existing similar engines and actual cost for upgrade of engines should be considered as capital improvement). For capital improvements not made within the first year after the initial acquisition, see Section VIII, Negotiated Procurement. Ownership is based on "Dredging time" defined as effective plus non-effective time. "Effective working time" is defined as time during the dredging operation when actual production is taking place. "Non-Effective working time" is defined as time during the dredging operation when the dredge is operational but no production is taking place. For complete definition of terms see ER 1110-2-1302 Civil Works cost Engineering regulation or EI 01 D010 Construction Cost Estimates.

a. The ownership rate is determined from the plant value and is the total expense rate for depreciation and FCCM. When cost or pricing data is available, the actual acquisition price shall be used. Otherwise, the value of a similar piece of plant is used and, if necessary, adjusted so that capacity, size, and horsepower are properly considered.

b. Ownership expense is determined on a yearly basis, distributed over a monthly basis. The monthly rate is calculated based on the available use months, by using the following formula:

$$\text{Ownership Per Month} = \text{Plant Value} \times (\text{DEPR} + \text{FCCM}) / \text{Available use months}$$

Where:

(1) DEPR = Ownership percent per year for depreciation

(2) FCCM = Ownership percent per year for Facilities Capital Cost of Money

4-8. Depreciation. Depreciation is computed using the straight-line method. The depreciable value is the acquisition cost, plus initial capital improvements, less estimated salvage. The basis for determining the yearly percentage factor for depreciation is expressed by formula, as follows:

$$\text{DEPR (percent per year)} = (1 - \text{SLV}) / N$$

Where:

(1) N = Ownership Life in Years

(2) SLV = Salvage Value

4-9. Facilities Capital Cost of Money (FCCM). FCCM is computed as shown in Chapter 2, except that FCCM is determined on a yearly basis instead of an hourly basis and is expressed here as an annual percentage factor. The cost-of-money rate (CMR) in effect at the time the work is performed or current rate shall apply. This formula is expressed as follows:

$$\text{FCCM (percent per year)} = \frac{[(N-1)(1+\text{SLV})+2](\text{CMR})}{2N}$$

Where:

CMR = Cost-of-money rate reduced by 25.0% for overhead and profit allowance

4-10. Other Ownership Elements. Taxes, storage (lay-up), and insurance are considered indirect (overhead) costs as defined in ER 1110-2-1302, Appendix D. These are not included in ownership rates as calculated in this chapter since they vary by geographic areas and with individual contractors. These costs should not be duplicated in the overhead in the estimate or submitted proposal.

SECTION VI. OPERATING FACTORS

4-11. Hourly Operating Cost. Ownership is based on effective time. Dredge plant operating factors are shown in TABLE 4-1. These factors, which are described below, are not intended to replace historical data but may be used when historical data is limited or non-existent.

4-12. Prime and Secondary Power. Prime power refers to the primary operating engine for the dredge or other piece of attendant plant. Secondary power refers to all other secondary engines or power plants. If more than one of these engines is present, the horsepower is totaled. Fuel consumption factors are prepared on the same basis as Chapter 2. If the estimator has more specific fuel consumption information, the horsepower factor (HPF) may be adjusted to reflect job conditions. The HPF factor is shown for information only in non-decimal format.

4-13. Water, Lube, and Supplies (WLS). This factor is similar to the FOG factor described in Chapter 2. This item is computed as either a percentage of the hourly fuel costs or, if the type of plant has no engine, a reasonable hourly cost should be included. This factor does not include an allowance for the oiler normally assigned to the dredge or other piece of dredge plant.

4-14. Repairs (RPR). This factor includes an allowance for all major and minor repairs and is similar to the maintenance and repair cost factor described in Chapter 2. The economic adjustment factor (EAF) and the labor adjustment factor (LAF) are required to develop this cost. It should be noted that the repair allowance does not include the following estimated additive items:

a. Excessive dredge wear for parts such as cutter teeth and main suction pumps are not included due to the wide variety of materials being dredged. The original cost of the bucket and normal wear are typically included in the plant value covered in the plant rate. Excessive bucket wear for mechanical dredges is estimated as an additive item or treated as a separate unit of equipment from TABLE 2-1. Allowances for wear due to abrasive material should only be included as an additive item if it is warranted and is not considered elsewhere in the estimate.

b. Dry docking costs, which represent an allowance for rental of the dry dock facility, are not included because they vary greatly depending on the facilities available. Repairs incurred while in dry dock, which occur periodically, are in the repair factor (RPR). Dry docking costs will be allocated on an average annual basis over the years between such occurrences (in accordance with FAR 31.205-24).

c. There is no predetermined allowance in the dredge plant methodology for jobsite yard costs, mobilization, or demobilization. All of these cost elements must be separately estimated to match each project's construction conditions.

SECTION VII. STANDBY

4-15. Standby Rate. The standby rate is computed by allowing the full ownership cost (full depreciation plus the full FCCM). In addition to the standby ownership rate, it may be necessary on dredges to include operating costs. A generator fuel allowance to account for operation of a diesel engine generator for power to operate pumps, navigation lights, minimum crew, etc. are examples of these operating costs.

a. Standby is directed delay by the Government and will not be allowed during periods when the plant would have otherwise been in idle status, such as non-effective working time. Since ownership is calculated based on life in years computed monthly, standby should be paid only when additional time has been directed by the government. Standby is to be paid on a 24-hour basis.

b. Standby for pipeline and accessories shall be based on pumping mud in determining values from TABLE 4-1.

SECTION VIII. NEGOTIATED PROCUREMENT

4-16. Rates. The calculated plant rates based on the methodology presented in this chapter should be used for preparing a reasonable contract estimate. When adequate cost or pricing data is available and is submitted by the contractor for negotiated procurement, the rates may be adjusted in accordance with the methodology in this chapter. Cost or pricing data is defined in Federal Acquisition Regulation (FAR), Subpart 15, Contracting by Negotiation (15.401 , Definitions) .

4-17. Allowance for Additional Capital Improvements. Allowance for additional capital improvements shall be calculated in accordance with accepted general accounting principles. When adequate cost or pricing data is not available , factors for a similar unit of equipment may be used for determining the ownership rate for overage equipment and plant.

4-18. Overage Plant

a. When the plant has exceeded the useful life given in TABLE 4-1, it is considered overage. The ownership rate for overage plant should be determined with the same methodology described in SECTION V with useful life as shown in TABLE 4-1.

b. When actual cost or pricing data is available to adjust the operating rate, the data must be adequate and established in accordance with accepted general accounting principles. When actual cost or pricing data is not available, the total hourly operating rate for overage equipment shall be computed on the basis that the equipment is equal to the Useful Life as shown in TABLE 4-1.

4-19. Dredge Plant Purchased Used. For plant purchased used, the ownership and operating rate must be calculated on an individual case, due to the varying conditions. When actual cost or pricing data is not available, the methodology from this chapter shall be used and values for life and salvage from TABLE 4-1 can be adjusted. Support for adjustments can be obtained by calling the Chief, Cost Engineering Branch, CENWW-ED-C, Corps of Engineers, Walla Walla District, telephone (509) 527-7511.

SECTION IX. RATE CALCULATION EXAMPLE

4-20. Rate Calculation Example. The example shown in Figure 4-2, Dredge Plant Ownership and Operating Worksheet illustrates the use of FIGURE 4-1, TABLE 4-1 and the regional data from APPENDIX B to generate a rate.

a. Ownership is determined by calculating yearly percentages to account for Depreciation and FCCM. Operating costs are determined by using formulas from Chapter 2 for FUEL, FOG (WLS), and REPAIRS.

b. For illustration purposes, assume that a 24" hydraulic dredge was purchased new in 1987 for \$3,700,000, including tax and delivery, and there were no initial capital improvements. This example uses 500 hours per month and a discounted cost-of-money rate (CMR) of 4.00%.

TABLE 4-1 DREDGE PLANT EXPENSE FACTORS												
TYPE OF PLANT	USEFUL LIFE	PHYSICAL LIFE	SALVAGE VALUE	PRIME ENGINE FUEL FACTOR			SECONDARY ENGINE FUEL FACTOR			WLS %		RPR %
	(YRS)	(HRS)	(SLV)	HPF	G	D	HPF	G	D	G	D	
HYDRAULIC DREDGES - PIPELINE (CUTTERHEAD OR DUSTPAN) (BASED ON DISCHARGE DIAMETER) (NON-TRUCKABLE)												
8-INCH AND UNDER	5	10,000	0.05	80	0.083	0.045	70	0.072	0.039	20	22	70
9-INCH THRU 10-INCH	6	12,000	0.05	80	0.083	0.045	70	0.072	0.039	20	22	80
11-INCH THRU 12-INCH	8	16,000	0.05	80	0.083	0.045	70	0.072	0.039	20	22	90
13-INCH THRU 15-INCH	15	40,000	0.05	80	0.083	0.045	70	0.072	0.039	20	22	100
16-INCH THRU 17-INCH	20	80,000	0.05	80	0.083	0.045	70	0.072	0.039	20	22	110
18-INCH THRU 20-INCH	20	100,000	0.05	80	0.083	0.045	70	0.072	0.039	20	22	120
21-INCH THRU 22-INCH	25	120,000	0.10	80	0.083	0.045	70	0.072	0.039	20	22	130
23-INCH THRU 24-INCH	25	130,000	0.10	80	0.083	0.045	70	0.072	0.039	20	22	130
25-INCH THRU 29-INCH	30	135,000	0.10	80	0.083	0.045	70	0.072	0.039	20	22	130
30-INCH OR LARGER	30	135,000	0.10	80	0.083	0.045	70	0.072	0.039	20	22	130
BOOSTERS - BARGE MOUNTED (FOR PIPELINE DREDGES)												
16-INCH THRU 17-INCH	20	80,000	0.05	80	0.083	0.045	70	0.072	0.039	22	24	80
18-INCH THRU 20-INCH	20	100,000	0.10	80	0.083	0.045	70	0.072	0.039	22	24	90
21-INCH THRU 22-INCH	25	120,000	0.10	80	0.083	0.045	70	0.072	0.039	22	24	100
23-INCH THRU 24-INCH	25	130,000	0.10	80	0.083	0.045	70	0.072	0.039	22	24	110
25-INCH THRU 29-INCH	30	135,000	0.10	80	0.083	0.045	70	0.072	0.039	22	24	120
30-INCH OR LARGER	30	135,000	0.10	80	0.083	0.045	70	0.072	0.039	22	24	120
MECHANICAL DREDGES (LARGE)* *SIZED BY THE LARGEST BUCKET USED (NORMALLY A MUD BUCKET)												
CLAMSHELL - UNDER 5 CY	8	16,000	0.05	70	0.072	0.039	60	0.062	0.033	22	24	90
CLAMSHELL - 6 CY TO 10 CY	13	26,000	0.05	70	0.072	0.039	60	0.062	0.033	22	24	100
CLAMSHELL - 11 CY TO 15 CY	20	40,000	0.05	70	0.072	0.039	60	0.062	0.033	22	24	110
CLAMSHELL - 16 CY TO 20 CY	25	75,000	0.05	70	0.072	0.039	60	0.062	0.033	22	24	120
CLAMSHELL - 20 CY AND OVER	30	90,000	0.05	70	0.072	0.039	60	0.062	0.033	22	24	130
ALL OTHER TYPES (BUCKET OR DIPPER)	25	90,000	0.10	70	0.072	0.039	60	0.062	0.033	22	24	120
BARGES (USED WITH DREDGING)												
FUEL OR WATER	20	90,000	0.05	20	0.021	0.011	20	0.021	0.011	18	20	60
EQUIPMENT OR WORK	20	90,000	0.05	20	0.021	0.011	20	0.021	0.011	18	20	60
DERRICK	20	90,000	0.10	20	0.021	0.011	20	0.021	0.011	18	20	70
ANCHOR	20	90,000	0.05	20	0.021	0.011	20	0.021	0.011	18	20	60
MOORING BARGE	20	90,000	0.05	20	0.021	0.011	20	0.021	0.011	18	20	60
DUMP SCOW	20	90,000	0.05	20	0.021	0.011	20	0.021	0.011	18	20	70

TABLE 4-1 DREDGE PLANT EXPENSE FACTORS (continued)												
TYPE OF PLANT	USEFUL LIFE	PHYSICAL LIFE	SALVAGE VALUE	PRIME ENGINE FUEL FACTOR			SECONDARY ENGINE FUEL FACTOR			WLS %		RPR %
	(YRS)	(HRS)	(SLV)	HPF	G	D	HPF	G	D	G	D	
TUGS & TENDERS (USED WITH DREDGING)												
UNDER 500 HP	8	16,000	0.10	80	0.083	0.045	70	0.072	0.039	32	38	80
500 THRU 1000 HP	10	20,000	0.10	80	0.083	0.045	70	0.072	0.039	32	38	90
1000 THRU 2000 HP	15	55,000	0.10	80	0.083	0.045	70	0.072	0.039	32	38	100
2000 THRU 3000 HP	20	100,000	0.10	80	0.083	0.045	70	0.072	0.039	32	38	110
OVER 3000 HP	25	120,000	0.10	80	0.083	0.045	70	0.072	0.039	32	38	120
BOATS - SEE CATEGORY M10.50												
PIPELINE & ACCESSORIES (CALM ENVIRONMENT)												
METAL PIPELINE (UNDER 20")												
PUMPING MUD	2	9,000	0.10	0	0.000	0.000	0	0.000	0.000	0	0	5
PUMPING SAND	1	4,500	0.10	0	0.000	0.000	0	0.000	0.000	0	0	5
PUMPING ROCK (GRAVEL)	0.3	1,500	0.10	0	0.000	0.000	0	0.000	0.000	0	0	5
JOINTS	3	12,000	0.10	0	0.000	0.000	0	0.000	0.000	0	0	30
PONTOONS/FLOATS	12	60,000	0.10	0	0.000	0.000	0	0.000	0.000	0	0	5
METAL PIPELINE (20" AND LARGER)												
PUMPING MUD	3	12,000	0.10	0	0.000	0.000	0	0.000	0.000	0	0	5
PUMPING SAND	1.5	6,000	0.10	0	0.000	0.000	0	0.000	0.000	0	0	5
PUMPING ROCK (GRAVEL)	0.5	2,000	0.10	0	0.000	0.000	0	0.000	0.000	0	0	5
JOINTS	3	12,000	0.10	0	0.000	0.000	0	0.000	0.000	0	0	30
PONTOONS/FLOATS	12	60,000	0.10	0	0.000	0.000	0	0.000	0.000	0	0	5
PIPELINE & ACCESSORIES (OCEAN ENVIRONMENT)												
METAL PIPELINE (ALL SIZES)												
PUMPING MUD	2	9,000	0.40	0	0.000	0.000	0	0.000	0.000	0	0	5
PUMPING SAND	1	4,500	0.40	0	0.000	0.000	0	0.000	0.000	0	0	5
PUMPING ROCK (GRAVEL)	0.3	1,500	0.40	0	0.000	0.000	0	0.000	0.000	0	0	5
JOINTS	1	4,500	0.40	0	0.000	0.000	0	0.000	0.000	0	0	5
PONTOONS/FLOATS	2	9,000	0.40	0	0.000	0.000	0	0.000	0.000	0	0	5
METAL SHORELINE												
PUMPING MUD	3	12,000	0.10	0	0.000	0.000	0	0.000	0.000	0	0	5
PUMPING SAND	1.5	6,000	0.10	0	0.000	0.000	0	0.000	0.000	0	0	5
PUMPING ROCK (GRAVEL)	0.5	2,000	0.10	0	0.000	0.000	0	0.000	0.000	0	0	5
Standby Calculation: Standby for pipeline and accessories shall be based on pumping mud.												

<u>1. PERTINENT DATA:</u>			
a.	Plant Description.....	>	24" Hydraulic Cutter Suction Dredge
~~~~~			
b.	Model & Series.....	>	Ellicott Series 4900 Super Dragon
~~~~~			
c.	Prime Engine Horsepower.....	>	3,730 HP
~~~~~			
d.	Secondary Engine(s) Horsepower. (example)		
(1)	Electrical Generators.....	>	200 HP
(2)	Hydraulic System.....	>	1,325 HP
(3)	Cutter Head Drive.....	>	750 HP
(4)	Hydraulic Water Jet.....	>	200 HP
			~~~~~
Total Secondary HP >			2,475 HP
e.	Plant Value		
(1)	Acquisition Price.....	>	\$3,700,000
(2)	Capital Improvements.....	>	\$0
			~~~~~
Total Plant Value			\$3,700,000
f.	Acquisition Year.....	>	1987
~~~~~			
g.	Present Year.....	>	1999
~~~~~			
h.	Cost of Money Rate (Undiscounted)..	>	5.000 %
~~~~~			
i.	Use Discounted Money Rate (5.000% / 1.25) =		4.000%
~~~~~			
j.	Hours Worked per Month (Effective Time).....	>	500 hrs/mo
~~~~~			
k.	Additive Item(s) (example)		
(1)	Excessive Dredge Wear (Gravel)	>	\$8,000 /month
(2)	_____	>	_____ /month
(3)	_____	>	_____ /month
(4)	_____	>	_____ /month
(5)	_____	>	_____ /month

Input data, methodology and notes used in the following sections of this form are or have reference to EP 1110-1-8, CONSTRUCTION EQUIPMENT OWNERSHIP AND EXPENSE SCHEDULE (See Chapter 4).

For information on cost-of-money rate and calculation of FCCM, see paragraph 4-9.

Cost-of-money rates are located in APPENDIX I.

SHEET 1 OF 5

FIGURE 4-2 - DREDGE PLANT OWNERSHIP AND OPERATING RATE WORKSHEET

2. APPENDIX "B" DATA:

a. LAF (Labor Adjustment Factor).....	>	1.030	
		~~~~~	
b. Fuel Type.....	>	Diesel (Off-Road)	
		~~~~~	
(1) Fuel Cost per Gallon.....	>	\$0.79	/gallon
		~~~~~	

3. APPENDIX E DATA: (EK 105)

a. Economic Index for Acquisition Year....	>	3886	<for 1987>
		~~~~~	
b. Economic Index for Present Year.....	>	5710	<for 1999>
		~~~~~	

4. Time Available to Dredge. (Refer to paragraph 4-3)

a. Months Available per year.....	>	9	months/year
		~~~~~	

(Months available per year based on Atlantic Coast & Tributaries Region, Figure 4-1)

5. TABLE 4-1 DATA:

a. Useful Life (in Years) for Ownership....	>	25	Years
		~~~~~	
a. Physical Life ( in Hours) for Repairs....	>	130,000	Hours
		~~~~~	
b. SLV (Salvage Value Factor).....	>	0.10	
		~~~~~	
c. Prime Engine Fuel Factor.....	>	0.045	
		~~~~~	
d. Secondary Engine Fuel Factor.....	>	0.039	
		~~~~~	
e. WLS (Water, Lube & Supplies Factor).....	>	22 %	= 0.22
		~~~~~	
f. RPR (Repair Cost Factor).....	>	130 %	= 1.30
		~~~~~	

SHEET 2 of 5

FIGURE 4-2 - DREDGE PLANT OWNERSHIP AND OPERATING RATE WORKSHEET (continued)

6. Ownership Expense Percent per Year

a. Depreciation Percent (%): =  $(1.0 - \text{SLV}) / N$

$$(1.0 - 0.10) / 25.00 = 3.60\%$$

b. FCCM Percent (%): =  $[(N-1)(1+\text{SLV}) + 2] \times \text{Discounted Money Rate} / 2N$

$$[(25.00 - 1)(1 + 0.10) + 2] \times 4.000\% / (2 \times 25.00) = 2.27\%$$

c. Total Ownership Percent Per Year.... $(3.60\% + 2.27\%) =$

$$5.87\%$$

7. OWNERSHIP COSTS:

a. Yearly Ownership Expense: = (Total Plant Value x Total Yearly Ownership %)

$$(\$3,700,000 \times 5.87\%) = \$217,190 \text{ /year}$$

b. Monthly Ownership Expense: = (Yearly Ownership Expense / Months Available per year)

$$(\$217,190 \text{ /yr} / 9 \text{ mos/yr}) = \$24,132 \text{ /month}$$

8. OPERATING COSTS:

a. Fuel Cost = (Engine Fuel Factor x HP x Fuel Cost/Gal)

(1) Prime Engine Fuel:

$$(0.045 \times 3,730 \text{ HP} \times \$0.79 \text{ /gal}) = \$132.60 \text{ /hour}$$

(2) Secondary Engine Fuel:

$$(0.039 \times 2,475 \text{ HP} \times \$0.79 \text{ /gal}) = \$76.25 \text{ /hour}$$

b. Water, Lube & Supply Cost = (WLS factor x Hourly Fuel Cost)

(1) Prime Engine WLS:

$$(0.22 \times \$132.60) = \$29.17 \text{ /hour}$$

(2) Secondary Engine WLS:

$$(0.22 \times \$76.25) = \$16.78 \text{ /hour}$$

SHEET 3 OF 5

FIGURE 4-2 - DREDGE PLANT OWNERSHIP AND OPERATING RATE WORKSHEET (continued)

8. OPERATING COSTS (Continued):

c. Repair Cost:

(1) EAF (Economic Adjustment Factor)

= (Economic Index for Present Year / Economic Index for Acquisition Year)

$$(5710 \text{ <for 1999> } / 3886 \text{ <for 1987> }) = 1.469$$

(2) Repair Cost:

= (Total Plant Value x RPR x EAF x LAF) / Life in hrs

$$(\$3,700,000 \times 1.30 \times 1.469 \times 1.030) / 130,000 \text{ hrs} = \$55.98 \text{ /hour}$$

d. Total Hourly Operating Cost = (Fuel + WLS + Repairs)

$$(\$132.60 + \$76.25 + \$29.17 + \$16.78 + \$55.98) = \$310.78 \text{ /hour}$$

e. Monthly Operating Cost: = (Total Hourly Operating Cost x Hours Worked per Month)

$$(\$310.78 \text{ /hour} \times 500 \text{ hours/month}) = \$155,390 \text{ /month}$$

9. SUBTOTAL MONTHLY EXPENSE = (OWNERSHIP + OPERATING)

$$(\$24,132 \text{ /month} + \$155,390 \text{ /month}) = \$179,522 \text{ /month}$$

10. ESTIMATED ADDITIVE ITEMS (Sheet 1, Item k.):

a. (1) Excessive Dredge Wear ( Gravel )	\$8,000	/month
(2) _____	_____	/month
(3) _____	_____	/month
(4) _____	_____	/month
(5) _____	_____	/month

b. Subtotal - Estimated Additive Items \$8,000 /month

11. TOTAL MONTHLY RATE (Items 9 + 10 b.)

\$187,522 /month

See following sheet for standby allowance.

SHEET 4 OF 5

FIGURE 4-2 - DREDGE PLANT OWNERSHIP AND OPERATING RATE WORKSHEET (continued)

12. STANDBY ALLOWANCE

a. Yearly Standby Expense:

= Ownerhip Cost from 7. a.

\$217,190 /year

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b. Monthly Standby Expense:

= Ownerhip Cost from 7. b.

\$24,132 /month

~~~~~

c. STANDARD HOURLY STANDBY EXPENSE:

= (Monthly Standby Expense / 730 hr/mo)

( \$24,132 /month / 730 hours/month ) =

\$33.06 /hour

~~~~~  
An additional generator fuel allowance may be allowed under certain circumstances. This allowance is
applicable to dredges only.
~~~~~

d. Generator Fuel Allowance for a Dredge:

= ((Generator HP / Total Secondary HP) x Secondary Fuel Cost)

((200 HP / 2,475 HP) x \$76.25) = +

\$6.16 /hour

~~~~~

e. TOTAL HOURLY STANDBY ALLOWANCE FOR A DREDGE:

= (Standby Allowance + Generator Fuel Allowance)

(\$33.06 + \$6.16) =

\$39.22 /hour

SHEET 5 OF 5

FIGURE 4-2 - DREDGE PLANT OWNERSHIP AND OPERATING RATE WORKSHEET (continued)